

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 4-7, 9-12, 15-18, and 20-22 are pending in this application. Claims 2, 3, 8, 13, 14, and 19 are canceled without prejudice or disclaimer and Claims 1, 7, 12, and 18 are amended. Amended Claims 1, 7, 12, and 18 are supported by the original claims, and therefore add no new matter.

In the outstanding Official Action, Claims 1-22 were rejected under 35 U.S.C. §103(a) as unpatentable over Applicant's Prior Art (Fig. 7) in view of Yano (U.S. Pat. No. 6,118,165 hereafter Yano).

The outstanding rejection is respectfully traversed for the following reasons.

Amended Claim 1 recites a semiconductor light-receiving device comprising:

- a semiconductor substrate having a first surface on a light-receiving side and a second surface on the opposite side to said first surface, said semiconductor substrate comprising a first conductivity type;

- a semiconductor layer formed on said first surface of said semiconductor substrate;

- a plurality of first semiconductor regions formed in said semiconductor layer so as to reach said semiconductor substrate from a surface of said semiconductor layer, said plurality of first semiconductor regions being formed apart from each other, and comprising the first conductivity type;

- a second semiconductor region selectively formed in a surface region of said semiconductor layer, said second semiconductor region having a lattice form or a network form to surround each of said plurality of first semiconductor regions with a surface portion of said semiconductor layer therebetween and comprising a second conductivity type;

- a first electrode formed on said second semiconductor region and having a lattice form or a network form; and

- a second electrode formed on said second surface of said semiconductor substrate;

- said surface portion of said semiconductor layer between each of said plurality of first semiconductor regions and said second semiconductor region having a higher

resistance than resistances of said plurality of first semiconductor regions and said second semiconductor region.

The outstanding Office Action states that the Applicant's Prior Art (Figure 7) discloses the elements recited in Claim 1 except for the second electrode, and further that Yano discloses a light-receiving device containing a photodiode having a second electrode formed on a second side of a substrate.

However, in the device shown in Figure 7 of the present application, electrodes 83 (cited on page 2 of the Outstanding Office Action as "a first electrode") do not have "a lattice form or a network form," as recited in amended Claim 1. In fact, the present specification describes at page 2, lines 5-8 that:

The P-type separating diffusion regions 72 and 75 are disposed such that they electrically separate the N-type epitaxial layer 74 into plural regions and that ***the outsides of the regions of both ends thereof in Fig. 7 are electrically separated. Each separated region functions as a photodiode*** (photodetecting portion). (emphasis added).

Accordingly, Figure 7 is described by the present specification as having electrodes 83 that are electrically separated, such the photodiodes connected to the electrodes function separately. Thus, electrodes 83 cannot have "a lattice form or a network form."

Further, it is respectfully submitted that Figure 7 of the present application corresponds to Figure 1 of Japanese Patent Application No. 10-270744 (cited in the Information Disclosure Statement filed March 22, 2001). Although other figures of Japanese Patent Application No. 10-270744 show electrodes 13 (which correspond to electrodes 83 of Figure 7 of the present application), none of the figures show electrodes 13 "having a lattice form or a network form." Thus, it is respectfully submitted that the cited art does not teach or suggest "a first electrode" as recited in Claim 1.

Further, in the device shown in Figure 7, P-type separating diffusion region 75 is disposed such that the region 75 electrically separates an N-type epitaxial layer 74 into plural light detecting regions. Thus, the arrangement of the P-type separating diffusion region 75 and the plural N-type diffusion regions 76 on a P-type substrate 81 is reverse to the arrangement of a “semiconductor substrate comprising a first conductivity type,” “a plurality of first semiconductor regions ... comprising the first conductivity type,” and “a second semiconductor region ... comprising a second conductivity type” recited in Claim 1. Further, it is respectfully submitted that Applicant’s Prior Art does not suggest these elements either.

Moreover, in the light-receiving device shown in Figure 7, the P-type separating diffusion region 75 and the plural N-type diffusion regions 76 are disposed close to each other with a very small interval therebetween. Light is incident on a region of the N-type epitaxial layer 74 between each of the plural N-type diffusion regions 76 and a P-type semiconductor substrate 81 through each of the plural N-type diffusion regions 76. The incident light is absorbed in each of the plural N-type diffusion regions 76, so that a sufficient sensitivity cannot be obtained.

Further, an electrode for taking out a substrate potential 83 is provided on the P-type separating diffusion region 75 and not on the other side of the P-type semiconductor substrate 81. Therefore, an area for contact to the electrode 83 is necessary on the P-type separating diffusion region 75, so that it is impossible to narrow a top surface area of the P-type separating diffusion region 75. This results in narrowing an area of the N-type epitaxial layer 74 between the P-type separating diffusion region 75 and each of the plural N-type diffusion regions 76, decreasing the amount light incident on the light-receiving surface of the semiconductor light-receiving device.

It is further respectfully submitted that Yano does not teach or suggest the above-mentioned features of amended Claim 1 and cannot obtain the advantages of the device recited in amended Claim 1.

Accordingly, as the cited art does not teach or suggest each and every element of amended Claim 1, it is respectfully submitted that Claim 1 (and Claims 4-6 dependent therefrom) is patentable over the cited art.

Independent Claims 7, 12, and 18 recite similar elements to Claim 1. It is respectfully submitted that Claims 7, 12, and 18 (and Claims 9-11, 15-17, and 20-22 dependent therefrom) are also patentable over the cited art for at least the reasons discussed above with respect to Claim 1.

Accordingly, the outstanding rejection is traversed and the pending claims are believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

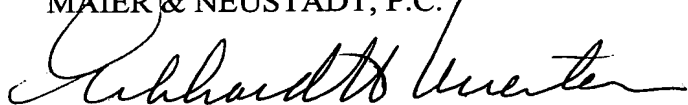
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